



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/533,619	03/22/2000	Angela T. Hui	1376P/D922	7885

7590
Joseph A Sawyer Jr
Sawyer & Associates
P O Box 51418
Palo Alto, CA 94303

11/18/2002

EXAMINER

LOUIE, WAI SING

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 11/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/533,619

Applicant(s)

HUI ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Feldner et al. (US 6,300,235), newly cited.

With regard to claim 1, Feldner et al. disclose a method of forming metal contacts in a semiconductor device (col. 4, line 8 to col. 8, line 27 and fig. 2) comprising:

- a) Providing an interlayer dielectric 418 on the lower layer (fig. 2c);
- b) Providing an antireflective coating (ARC) layer 513, at least a portion of the ARC layer 513 being on the interlayer dielectric 418 (fig. 2c);
- c) Providing a plurality of via holes 508 in the interlayer dielectric 418 and the ARC layer 513 (col. 1, lines 19-23);

- d) Filling the plurality of via holes 508 with a conductive material (col. 1, lines 40-44);
- e) Removing the ARC layer 513 (col. 6, lines 54-60). Inherently, the undesirable conductivity material in the trench and via would be removed along with the photoresist 500 and ARC 513. Feldner et al. disclose using RIE etching to remove ARC layer (col. 6, line 56).

With regard to claim 6, Feldner et al. disclose the device represents a structure employed to fabricate a plurality of memory cells such as RAM, DRAM, and ROM (col. 4, 55-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Feldner et al. (US 6,300,235).

With regard to claim 7, Feldner et al. disclose the trench is filled with metal, which is then polished (col. 1, lines 29-32), but do not disclose a chemical mechanical polish process is used. However, the chemical mechanical polish process is well known process in the art. Therefore, it would have been obvious to use chemical mechanical polish process to polish the metal.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feldner et al. (US 6,300,235) in view of Brooks et al. (US 5,786,276), previously used.

With regard to claims 2 and 3, Feldner et al. disclose utilizing a RIE with C_4F_8 type fluorine containing chemistry etching (col. 6, lines 54-62), but do not disclose the plasma etching with CH_3F/O_2 or CHF_3/O_2 . However, Brooks et al. disclose a plasma etching process (Brooks col. 2, lines 50-54) using a mixture of methyl fluoride (CH_3F), carbon tetrafluoride (CF_4) and oxygen (O_2) to remove the ARC (Brooks col. 2, lines 57-64 and table 1A). Brooks et al. teach that it is difficult to etch silicon nitride (Brooks col. 2, lines 31-36) and Brooks et al. introduce the chemical downstream etching which is faster and selectively for nitride (Brooks col. 3, lines 20-23). Therefore, it would have been obvious to one with ordinary skill in the art to modify Feldner's method with the teaching of Brooks et al. to use CH_3F , CF_4 , and O_2 mixture to dry plasma etch the ARC in order to yield faster rate.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feldner et al. (US 6,300,235) in view of Wu et al. (US 6,222,214), previously used.

With regard to claim 4, Feldner et al. disclose the conductive material used to fill the plurality of via holes (col. 1, lines 40-44), but do not disclose the conductivity material is tungsten. However, tungsten is a common material used to create a contact plug, such as disclosed in Wu et al. (Wu col. 7, lines 12-13). Therefore, it would have been obvious to use tungsten to fill the plurality of via holes.

With regard to claim 5, Feldner et al. do not disclose the interlayer dielectric is BPTEOS. However, Wu et al. disclose a method of forming metal contacts in a semiconductor device utilizing BPTEOS as interlayer dielectric layer (Wuu col. 6, lines 32-44). Wu et al. teach that BPTEOS is a low flow glass and a good barrier layer (Wuu col. 6, lines 32-44). Therefore, it would have been obvious to one with ordinary skill in the art to modify Feldner's method with the teaching of Wu to use BPTEOS as dielectric interlayer in order to apply it easily and it is good barrier layer.

Response to Arguments

Applicant pointed out that reference Shields (US 6,316,345) is not a prior art. Therefore, Shields is no longer used in above rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Application/Control Number: 09/533,619

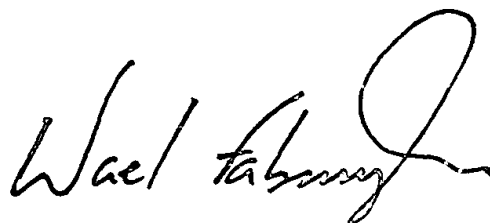
Page 6

Art Unit: 2814

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

wsl

November 11, 2002

A handwritten signature in black ink, appearing to read "Wael Tabany". The signature is fluid and cursive, with a large loop at the end.

SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800